A new genus and species of hermit crabs (Decapoda, Anomura, Paguridae) from the western Pacific

Michèle de SAINT LAURENT
Laboratoire de Zoologie (Arthropodes), Muséum national d'Histoire naturelle,
61 rue de Buffon, F-75231 Paris cedex 05 (France)
michelea@mnhn.fr

Patsy A. McLAUGHLIN
Shannon Point Marine Center, 1900 Shannon Point Road,
Anacortes WA 98221-9081B (U.S.A.)
patsy@henson.cc.wwu.edu

Saint Laurent de M. & McLaughlin P. A. 1999. — A new genus and species of hermit crabs (Decapoda, Anomura, Paguridae) from the western Pacific. *Zoosystema* 21 (1) : 77-92.

ABSTRACT
A new genus is proposed for a new species widely distributed in the western Pacific Ocean from the Philippine Islands in the northwestern Pacific south to Kermadec Islands of New Zealand. *Jacquesia* n.g., bears considerable similarity to *Iridopagurus* de Saint Laurent-Dechancé, 1966, in lacking an accessory tooth on the crista dentata of the third maxilliped, but having eleven pairs of quadriserial gills, slender elongate and subequal chelipeds, and a well-developed left male sexual tube. It is distinguished from *Iridopagurus* by the presence of paired first pleopods in females. The new species is a very distinct, but morphologically variable species. These variations, however, do not appear to be correlated with either size or sex.

KEY WORDS
Crustacea,
Decapoda,
Anomura,
Paguridae,
new genus,
new species,
western Pacific.

RÉSUMÉ

Un nouveau genre de Paguridae (Crustacea, Decapoda, Anomura) pour une nouvelle espèce du Pacifique occidental.

Un nouveau genre de la famille des Paguridae est établi pour une espèce nouvelle, très largement répandue dans le Pacifique occidental, depuis l'archipel des Philippines au nord jusqu'à celui des Kermadec (Nouvelle-Zélande) au sud. Ce nouveau taxon appartient au groupe des Paguridae à onze paires de branchies quadrisériées, dont l'ischion des troisièmes maxillipèdes est dépourvu de dent accessoire à la crista dentata et dont les mâles possèdent un tube sexuel bien développé à gauche. Bien qu'il se distingue immédiatement des autres genres du même groupe par la possession de pléopodes pairs sur le premier segment abdominal des femelles, il présente de nombreuses similitudes avec le genre ouest-atlantique *Iridopagurus* de Saint Laurent-Dechancé, 1966. Bien caractérisée, l'espèce nouvelle est cependant morphologiquement très variable. Les variations observées concernent particulièrement la dimension et la forme du tube sexuel mâle, la forme et l'ornementation des mains des chélipèdes. Apparemment indépendantes de la taille ou du sexe des spécimens, elles paraissent plutôt en relation avec leur origine géographique et/ou leur habitat.

MOTS CLÉS
Crustacea,
Decapoda,
Anomura,
Paguridae,
genre nouveau,
espèce nouvelle,
Pacifique occidental.

INTRODUCTION

Specimens representing this new genus and species were first observed by the senior author among the collections of the Musorstom Philippines II Expedition of 1980. Numerous specimens were subsequently found by the second author in the collections of the Musorstom cruises to the environs of New Caledonia and Vanuatu, 1984-1995. Although it was the authors' initial intent to include this monotypic new genus in a full report of Musorstom taxa, their discovery of its occurrence in the Kermadec Islands of New Zealand, and need to include it in the forthcoming New Zealand faunal monograph, has made its more immediate publication necessary. The new genus is diagnosed, and its relationship to other paguroid genera discussed. The new species is described in detail. Pertinent aspects of its morphology are illustrated, including cheliped variation.

MATERIALS AND METHODS

Materials for this study have come primarily from MUSORSTOM (acronym for the joint expeditions by the Muséum national d'Histoire naturelle, Paris, and the Office de la Recherche Scientifique et Technique Outre-Mer) cruises, with the Kermadec Islands specimens provided by the National Museum of New Zealand (NMNZ) [now Museum of New Zealand Te Papa Tongarewa (MoNZ)] and the New Zealand Oceanographic Institute (NZOI) (now part of the National Institute of Water and Atmospheric Research (NIWA)]. One measurement, shield length (sl), measured from the midpoint of the rostral lobe to the midpoint of the posterior margin of the shield provides an indication of animal size. Terminology follows that of McLaughlin & de Saint Laurent (1998).

Not all specimens examined are types. The holotype and selected paratypes and most non-type specimens have been deposited in the Muséum national d'Histoire naturelle, Paris (MNHN), or returned to their institutions of origin. Additional paratypes have been deposited in the New Zealand Oceanographic Institute, the Natural Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), and The Natural History Museum, London (NHM). MUSORSTOM station data have been taken primarily from the published

cruise records (Forest 1985; Richer de Forges 1990, 1993; Richer de Forges & Chevillon 1996; Richer de Forges *et al.* 1996).

The following abbreviations identify campaign, sample type or gear:

BS	bottom sample;
CP	beam trawl;
DC	Charcot dredge;
DW	Waren dredge;
SMIB	Substances Marines d'Intérêt Biologique.

SYSTEMATICS

Jacquesia n.g.

TYPE SPECIES. — *Jacquesia polymorpha* n.sp., by present designation and monotypy.

ETYMOLOGY. — Named for Professor Jacques Forest, in recognition of his many contributions to crustacean morphology and systematics in general and to paguroids in particular. Gender feminine.

DIAGNOSIS

Eleven pairs of quadriserial gills. Rostrum rounded, usually produced only slightly beyond bases of ocular acicles. Lateral projections prominent. Ocular peduncles moderately slender basally, expanded distally; corneae somewhat dilated. Ocular acicles narrowly triangular, terminating acutely, with strong submarginal spine. Antennular peduncles usually with elongate ultimate segment fringed with long setae near dorsodistal margin and longitudinal row of long setae dorsolaterally. Endopod of maxillule with very prominent, non-recurved external lobe. Third maxilliped with well-developed crista dentata, without accessory tooth; merus with very long slender spine on dorsodistal margin.

Chelipeds subequal in length, right stronger, but not always longer.

Ambulatory legs with elongate, slender dactyls; carpi (at least second) with row of spines on dorsal margin but not at dorsodistal angle. Fourth pereopods subchelate or very weakly semichelate, with single row of scales in propodal rasp. Fifth pereopods subchelate.

Males with club-like, stout, very short to moderately long left sexual tube, provided with terminal tufts of very long setae and additional longitudinal row of long setae basally; coxa of right fifth pereopod with small anteromesially-placed gonopore; three unequally biramous left pleopods. Females with paired gonopores; coxae of fifth pereopods with fringe of moderate to dense long setae; paired first pleopods, unpaired left pleopods 2-5.

Uropods markedly asymmetrical. Telson with weak transverse indentation suggesting division into anterior and posterior portions; posterior lobes asymmetrical, left largest; terminal margins very oblique, each with well-developed spines; posterolateral margins each with calcified plate.

REMARKS

In having eleven pairs of quadriserial gills, *Jacquesia* demonstrates the plesiomorphic lamellar condition (cf. de Saint Laurent-Dechancé 1966b) that is also seen in *Iridopagurus* de Saint Laurent-Dechancé 1966, and *Turleania* McLaughlin, 1997. Males of all three genera have a well-developed left sexual tube; however, while the tube terminates with a sparc tuft of setae in *Turleania*, in the presently monotypic *Jacquesia*, the tip is practically obscured by tufts of long dense setae. Although all three genera also lack an accessory tooth on the crista dentata of the third maxilliped, it is with *Iridopagurus* that *Jacquesia* appears to have the closest phylogenetic relationship. Species of both genera have moderately short ocular peduncles with somewhat dilated corneas; the ocular acicles are narrowly triangular. The antennular peduncles (Fig. 1A) commonly are provided with a distal row of long setae on the ultimate segment, as well as a prominent lateral spine on the statocyst lobe of the basal segment. In the structure of the mouthparts (Fig. 1B-F), the external endopodal lobe of the maxillule is more strongly developed in *Jacquesia* than in *Iridopagurus*, as illustrated by de Saint Laurent-Dechancé (1966a) for *Iridopagurus iris* (A. Milne Edwards, 1880), but the basally swollen and distally rod-shaped exopod of the first maxilliped is virtually identical in the two genera. Species of both genera also have a very prominent meral spine on the third maxilliped. Similarities are found as well in the shapes and

armature of the chelipeds and ambulatory legs in species of both; however, only in *Jacquesia* are females provided with paired first pleopods.

Jacquesia polymorpha n.sp.
(Figs 1-4)

TYPE MATERIAL. — Holotype: ♂, 5.0 mm (MNHN Pg 5655), Vanuatu, Musortom 8, stn CP 1084, 15°50'S, 167°17'E, 207-280 m.
Paratypes: 1 ♂ 3.4 mm, 1 ovigerous ♀, 4.7 mm (USNM 261450) Chesterfield Islands, Musorstom 5, stn CP 311, 22°14'S, 159°23.9'E, 320 m.
– 1 ♂, 4.9 mm (MNHN Pg 5656), Chesterfield Islands, Chalcal 1, stn DC 68, 22°34.2'S, 159°15.5'E, 296 m.
– 1 ♂, 2.6 mm, 1 ♀, 3.6 mm (NHM), Chesterfield Islands, Musorstom 5, stn DW 255, 25°15.4'S, 159°54.8'E, 280-295 m.
– 3 ♂♂, 3.4-4.2 mm, 3 ♀♀, 2.0-3.7 mm, 1 ovigerous ♀, 3.5 mm (MNHN Pg 5656), New Caledonia, Smib 5, stn DW 88, 22°18.6'S, 168°40.2'E, 35 m.

ETYMOLOGY. — From the Latin *polus*, meaning much or many, and *morphe*, meaning form or shape and referring to the great morphological variability seen in this species.

MATERIAL EXAMINED. — **Philippine Islands.** Musorstom 2, stn 54, 27.XI.1980, 13°59.5'N, 120°09.3'E, 170-174 m, 1 ♂, 4.2 mm (MNHN Pg 5652). — Stn 57, 28.XI.1980, 18°51.9'N, 120°03.7'E, 132-156 m, 2 ♂♂, 3.7 mm, 4.2 mm (MNHN Pg 5654). — Stn 61, 29.XI.1980, 14°00'N, 120°16.4'E, 1 ovigerous ♀, 4.5 mm (MNHN Pg 5653).
New Caledonia, Norfolk and Loyalty Ridges. Musorstom 4, stn DW 184, 18.IX.1985, 19°04'S, 163°27.5'E, 260 m, 3 ♂♂, 2.6-3.7 mm, 3 ovigerous ♀♀, 4.3-4.8 mm (MNHN Pg 5675).
Musorstom 6, stn DW 479, 22.II.1989, 21°09.1'S, 167°54.95'E, 310 m, 1 ♀, 2.9 mm (MNHN Pg 5681).
Northwest Lagoon, stn 1051, 4.V.1988, 20°11.8'S, 164°10.5'E, 11-12 m, 1 ♀, 3.3 mm (MNHN Pg 5658).
Chalcal 2, stn DW 69, 27.X.1986, 24°44'S, 168°08'E, 260 m, 1 ♂, 2.2 mm (MNHN Pg 5661).
Smib 3, stn DW 18, 23.V.1987, 23°42'S, 167°59'E, 338 m, 2 ♂♂, 2.5 mm, 4.5 mm (MNHN Pg 5662).
Smib 4, stn DW 42, 8.III.1989, 24°45.7'S, 168°08.4'E, 320 m, 1 ♂, 2.6 mm (MNHN Pg 5663). — Stn DW 44, 8.III.1989, 24°46'S, 168°08.2'E, 300 m, 2 ♂♂, 2.2-4.6 mm (MNHN Pg 5664). — Stn DW 46, 8.III.1989, 24°46.7'S, 168°08.5'E, 260 m, 1 ♂, 3.4 mm, 1 ovigerous ♀, 2.9 mm (MNHN Pg 5665).
Smib 5, stn DW 87, 11.IX.1989, 22°18.7'S, 168°41.3'E, 370 m, 1 ♂, 2.3 mm (MNHN Pg 5666). — Stn DW 88, 11.XI.1989, 22°18.6'S, 168°40.2'E, 350 m, 3 ♂♂, 3.4-4.2 mm, 3 ♀♀, 2.0-3.7 mm, 1 ovigerous ♀, 3.5 mm (paratypes) (MNHN Pg 5657).
Smib 8, stn DW 155, 28.I.1993, 24°45'S, 168°08'E, 257-262 m, 1 ovigerous ♀, 2.7 mm (MNHN Pg 5667). — Stn DW 157, 28.I.1993, 24°46'S, 168°08'E, 251-255 m, 1 ♂, 4.7 mm, 1 ♀, 3.0 mm (MNHN Pg 5668). — Stn DW 158, 28.I.1993, 24°46'S, 168°02'E, 262-290 m, 1 ♀, 2.6 mm (MNHN Pg 5669). — Stn DW 165, 28.I.1993, 24°.48'S, 168°10'E, 372-660 m, 1 ♂, 4.7 mm (MNHN Pg 5670). — Stn DW 175, 29.I.1993, 23°41'S, 168°00'E, 235-240 m, 1 ♂, 3.7 mm (MNHN Pg 5671). — Stn DW 182, 31.I.1993, 23°18'S, 168°05'E, 314-340 m, 1 ovigerous ♀, 5.7 mm (MNHN Pg 5672).
Smib 10, stn DW 209, 10.I.1995, 24°49'S, 168°09'E, 329-560 m, 1 ♂, 3.6 mm, 1 ovigerous ♀, 6.6 mm (MNHN Pg 5673). — Stn DW 210, 10.I.1995, 24°49'S, 168°09'E, 308-510 m, 1 ♂, 3.2 mm (MNHN Pg 5674).
Volsmar, stn DW 40, 8.VI.1989, 22°20'S, 168°42.2'E, 295 m, 1 ♂, 4.9 mm, 1 ♀, 2.6 mm (MNHN Pg 5682).
Beryx 11, stn DW 18, 16.X.1992, 24°47.90'S, 168°09.05'E, 250-270 m, 2 ♂♂, 2.2-4.6 mm (MNHN Pg 5687).
Bathus 4, stn DW 924, 7.VIII.1994, 18°54'S, 163°24'E, 344-360 m, 1 ovigerous ♀, 3.6 mm (MNHN Pg 5688). — Stn DW 936, 8.VIII.1994, 19°03'S, 163°28'E, 258-252 m, 1 ♀, 4.0 mm (MNHN Pg 5689). — Stn CP 939, 8.VIII.94, 18°58'S, 163°25'E, 304-320 m, 1 ♀, 4.0 mm (MNHN Pg 5690). — Stn DW 940, 8.VIII.1994, 18°59'S, 163°25'E, 305 m, 4 ♂♂, 3.1-3.8 mm, 1 ♀, 2.0 mm, 1 ovigerous ♀, 3.3 mm (MNHN Pg 5691). — Stn DW 942, 8.VIII.1994, 19°04'S, 163°27'E, 270-264 m, 2 ♂♂, 3.7, 4.1 mm, 1 ovigerous ♀, 4.3 mm (MNHN Pg 5692).
Halical 1, stn DW 04, 28.XI.1994, 18°55'S, 163°24'E, 350-365 m, 1 ovigerous ♀, 3.6 mm (MNHN Pg 5683).
Chesterfield Islands and Lord Howe Ridge. Chalcal 1, stn CP17, July 1984, 28°34.7'S, 159°15.3'E, 295 m, 1 ♂, 3.7 mm (MNHN Pg 5659). — Stn DC61, 26.VII.1984, 21°42.4'S, 159°29'E, 50 m, 1 ♂, 3.6 mm, 2 ♀♀, 2.6, 3.9 mm (MNHN Pg 5660). — Stn DC 68, 27.VII.1984, 22°34.2'S, 159°15.5'E, 296 m, 1 ♂, 4.9 mm (paratype) (MNHN Pg 5656).
Musorstom 5, stn DW 255, 7.X.1986, 25°15.4'S, 159.54.8'E, 280-295 m, 1 ♂, 2.6 mm, 1 ♀, 3.6 mm (paratypes) (NHM 5676). — Stn CP 311, 12.X.1986, 22°14'S, 159.23.9'E, 320 m, 1 ♂, 3.4 mm, 1 ovigerous ♀, 4.7 mm (paratypes) (USNM 261450). — Stn CP 312, 12.X.1986, 22°17.2'S,

159.24.8'E, 315-320 m, 2 ♂♂, 3.1, 3.2 mm, 2 ♀♀, 1.2, 2.8 mm, 2 ovigerous ♀♀, 3.7, 3.8 mm (MNHN Pg 5677). — Stn CP 318, 13.X.1986, 22°26.5'S, 159.21.4'E, 330 m, 1 ♂, 3.4 mm, (MNHN Pg 5678. — Stn DW 361, 19.X.1986, 19°52.5S, 158.38.1'E, 400 m, 1 ♂, 2.2 mm (MNHN Pg 5679). — Stn DW 378, 20.X.1986, 19°53.7'S, 158°38.3'E, 355 m, 1 ♂, 3.6 mm (MNHN Pg 5680).
Vanuatu Archipelago. Musorstom 8, stn DW 963, 21.IX.1994, 20°20'S, 169°49'E, 400-440 m, 1 ovigerous ♀, 4.0 mm (MNHN Pg 5684). — Stn DW 964, 21.IX.1994, 20°19'S, 169°49'E, 360-408 m, 1 ovigerous ♀, 3.9 mm (MNHN Pg 5685). — Stn DW 1070, 4.X.1994, 15°36'S, 167°16'E, 184-190 m, 1 ♀, 3.4 mm (MNHN Pg 5686). — Stn CP 1084, 5.X.1994, 15°50'S, 167°17'E, 207-280 m, 1 ♂ (holotype), 5.0 mm (MNHN Pg 5655).
Kermadec Islands, New Zealand. Stn K 857, 30.VII.1974, 30°33.8'S, 17830.6'W, 165-180 m, 1 ♂, 3.9 mm (NZOI). — Stn BS 571, 16.IX.1975, 29°18.9'S, 177°54.2'W, 274-210 m, 1 ♂, 4.4 mm, 1 ♀, 4.6 mm (NMNZ).

DISTRIBUTION. — Philippine Islands: northwest of Mindoro, New Caledonia, Norfolk and Loyalty Ridges, Chesterfield Islands, Vanuatu archipelago, Kermadec Islands. Most commonly between 150 and 400 m, but reported from 11 to 660 m (see "Remarks").

HABITAT. — Found occupying gastropod shells.

DIAGNOSIS

Shield usually as broad or broader than long, occasionally slightly longer than broad. Rostrum usually produced but not reaching beyond level of lateral projections; broadly rounded, occasionally nearly obsolete. Ocular peduncles 0.65 to nearly entire length of shield; corneas slightly dilated; ocular acicles each with prominent submarginal spine. Antennular peduncles overreaching distal margins of cornea by half or more than half length of ultimate segment; ultimate segment usually with row of long setae adjacent to dorsodistal margin and longitudinal row of long setae on dorsolateral surface. Antennal peduncles overreaching distal margins of corneas by up to half length of ultimate segment. Antennal acicles reaching to or beyond distal margins of corneas.

Chelipeds both with dense covering of long and frequently also short setae on chelae and carpi, at least partially concealing armature. Right cheliped with dactyl and fixed finger frequently roundly or acutely triangular in dorsal view. Palm with single or double row of short to long, slender to moderately stout spines of both dorsomesial and dorsolateral margins, dorsal surface with several irregular longitudinal rows of small spines or spinules, extending onto dorsolateral surface of fixed finger. Carpus with spines on dorsomesial and dorsolateral margins; lateral face frequently with few small spines, particularly in ventral half. Merus with two to five acute spines on ventrolateral distal margin; blunt or subacute protuberance at ventromesial angle; ventral surface often with few small spines or spinules. Left cheliped often equalling, sometimes exceeding, right in length but less robust; chela often narrowly to roundly triangular in dorsal view. Palm with row of slender, short to quite long spines on both dorsomesial and dorsolateral margins, dorsal surface with numerous irregular longitudinal rows of small spines and spinules extending at least onto proximal half of fixed finger. Carpus subtriangular; dorsomesial margin with row of moderate to long acute spines usually second short row of smaller spines on sloping dorsolateral face; somewhat rounded ventrolateral margin with irregular single or double row of spines, lateral face frequently with several smaller spines on ventral half. Merus with one spine on dorsodistal margin; ventrolateral margin with two to five acute spines on distal half, ventromesial margin with one to three subacute spines near distal angle.

Ambulatory legs similarly armed from left to right, but segments proportionally dissimilar. Dorsal margins of dactyls each with row of long bristle-like setae, mesial faces with covering of long stiff setae and dorsally accompanied by row of pinnate, spiniform setae in proximal half, mesial faces ventrally and/or ventromesial margins each with seven to ten shorter spiniform setae. Carpi each with row of five to twelve spines dorsal surface, spines of third pereopods usually smaller and sometimes fewer in number. Meri of second pereopods each with two to five small spines or spinules in distal half of ventral margins; third unarmed.

Coxae of left fifth pereopods in males with thick, short to moderately long, setose sexual tube

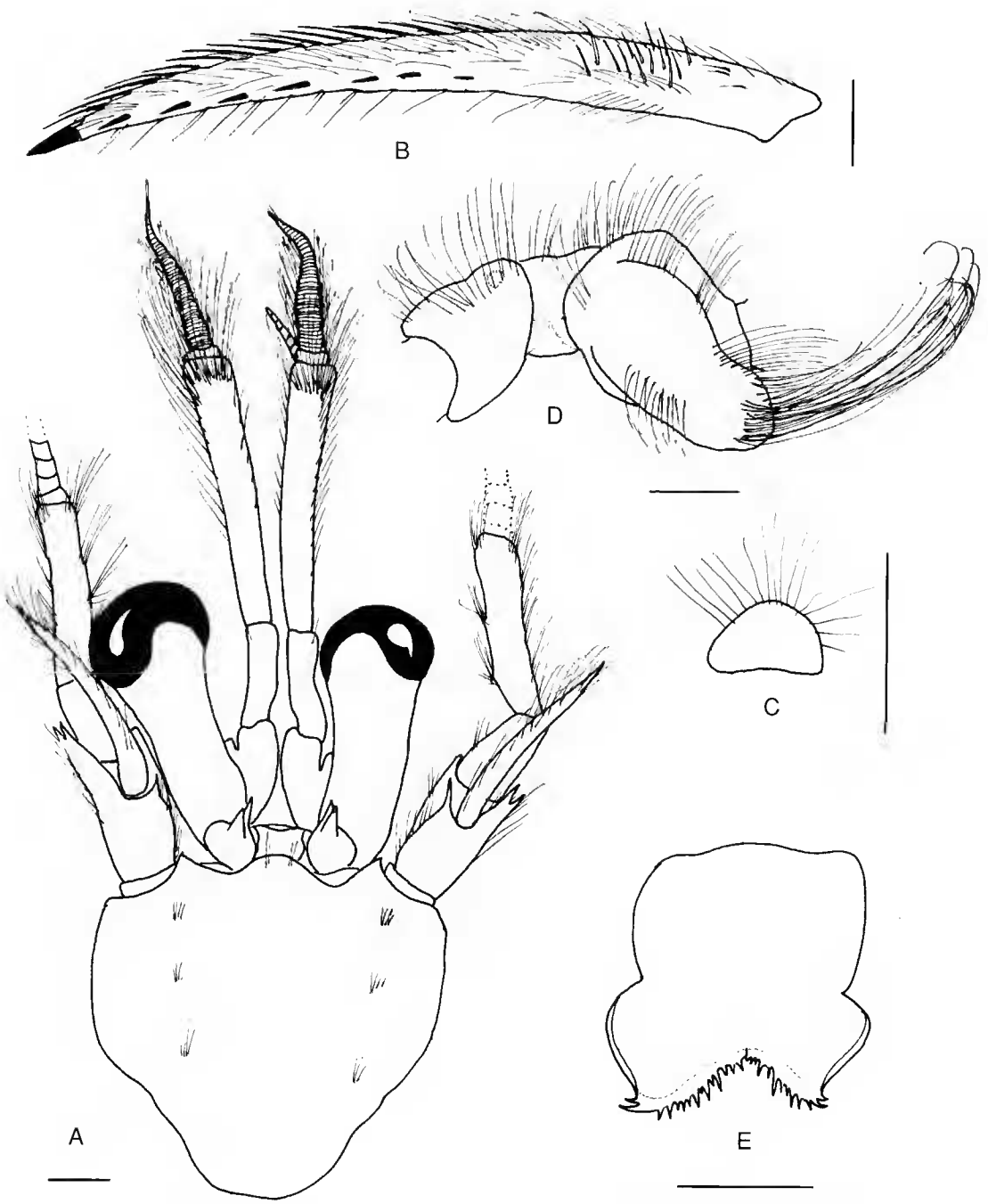

FIG. 1. — *Jacquesia polymorpha* n.sp., holotype ♂, 5.0 mm (MNHN Pg 5655); **A**, shield and cephalic appendages; **B**, dactyl of right second pereopod (mesial view); **C**, anterior lobe of fifth thoracic somite (between Mxp3); **D**, coxae and sternite of last thoracic somite; **E**, telson. Scale bars: 1.0 mm.

directed posteriorly toward exterior. Telson with one to three prominent, curved or hooked spines on each outer angle; terminal margins oblique, each with row of smaller acute spines.

DESCRIPTION

Shield (Fig. 1A) as broad to 1.2 broader than long, occasionally slightly longer than broad; anterior margin between rostrum and lateral projections concave; anterolateral margins sloping, slightly terraced or weakly concave; posterior margin truncate; dorsal surface with few tufts of setae anteriorly and laterally. Rostrum usually produced but not reaching beyond level of lateral projections; broadly rounded, occasionally nearly obsolete. Lateral projections well-developed, subacutely or acutely triangular, usually with marginal or submarginal spine, sometimes only corneous-tipped spinule.

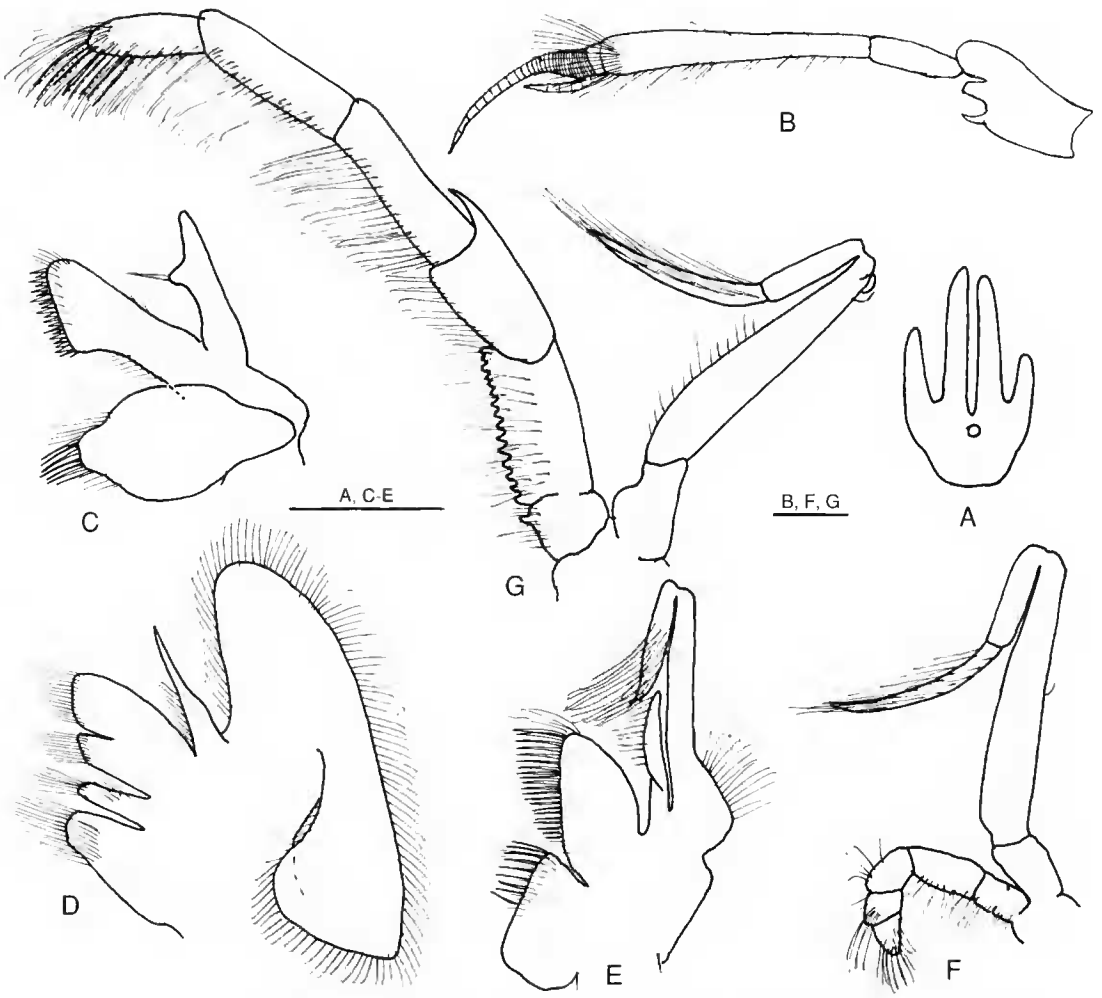

FIG. 2. — *Jacquesia polymorpha* n.sp., ♂ paratype, 4.9 mm (MNHN Pg 5656); **A**, gill lamella from distal portion of arthrobranch of seventh thoracic somite; **B**, left antennule (dorsal view, aesthetasks omitted); **C**, left maxillule (external view); **D**, left maxilla (external view); **E**, left first maxilliped (external view); **F**, left second maxilliped (external view); **G**, left third maxilliped (external view). Scale bars: A, 0.5 mm; B-G, 1.0 mm.

Ocular peduncles (including corneas) approximately 0.65-0.95 shield length; moderately slender basally, broadened at bases of slightly dilated corneas; corneal diameter 0.38-0.57 length of peduncle. Ocular acicles narrowly and acutely triangular, with very prominent submarginal spine. Acicles widely separated by prominent, slightly concave interocular lobe.

Antennular peduncles (Figs 1A, 2B) when fully extended, overreaching distal margins of corneas by 0.50-0.90 length of ultimate segment. Ultimate segment usually with row of long setae adjacent to dorsodistal margin and longitudinal row of long setae on dorsolateral surface. Penultimate segment with few short setae. Basal segment with statocyst region expanded laterally and dorsoventrally flattened, with acute spine on dorsolateral margin. Antennal peduncles (Fig. 1A) overreaching distal margins of corneas by 0.25-0.50 length of ultimate segment. Fifth and fourth segments with numerous long setae dorsally and ventrally. Third segment unarmed. Second segment with latero-distal projection reaching from 0.25 of fourth peduncular segment to nearly distal margin, terminating in acute simple or bifid spine; dorso-mesial distal angle with prominent acute spine. First segment with usually small, sometimes prominent, simple or bifid spine dorsodistally above antennal gland orifice. Antennal acicle reaching nearly to distal margins or often reaching considerably beyond distal margins of corneas; terminating in acute spine and with long setae on mesial margin. Antennal flagella overreaching outstretched chelipeds, with one or two (one to two article length) every other article and one or two long (four to five article length) every eight to twenty-five articles.

Right cheliped (Fig. 1A) with chela varying from moderately long and stout to long and moderately slender (Tables 1, 2); dactyl and fixed finger often roundly or acutely triangular in dorsal view. Dactyl 0.65-1.5 length of palm, usually overlapped by fixed finger; cutting edge with one or two low broad calcareous teeth in proximal half, few very small calcareous teeth, sometimes nearly fused, distally; terminating in small corneous claw; dorsomesial margin with single or double row of short to long, conical acute or subacute spines, dorsal surface flattened or slightly convex, with long setae obscuring one to three irregular rows of small spines or spinules at least in proximal half; ventral and mesial surfaces also with tufts of long setae. Palm 0.75 to equal length of carpus; dorsomesial margin with single or irregularly double row of short to long, slender to moderately stout, often conical spines; dorsal surface flattened to slightly convex, with several irregular longitudinal rows of small spines and spinules, extending onto dorsolateral surface of fixed finger; dorsolateral margin with single or nearly double row of moderately strong conical spines, at least on distal portion of palm and decreasing in size toward tip of fixed finger; armature partially to entirely obscured by short and long simple setae; mesial, lateral and ventral surfaces all with numerous short transverse rows of long setae; dorsal surface of fixed finger also with numerous long setae; cutting edge with one or two large rather blunt and few to several small calcareous teeth, terminating in small corneous or calcareous claw. Carpus equal to or slightly longer than merus; dorsomesial margin with row of acute spines at least in distal half, strongest at dorsodistal angle, dorsal surface with scattered long setae, dorsolateral margin with single or irregular double row of spines, mesial and ventral surfaces with short transverse rows of long setae; lateral face frequently with few small spines dorsally at least partially obscured by long setae, ventrolateral margin with prominent spine distally. Merus with numerous long setae on dorsal margin and mesial and lateral faces; ventrolateral distal margin with two to five acute spines; blunt or subacute protuberance at ventromesial angle; ventral surface often with few small spines or spinules. Ischium with setae mesially and ventrally.

Left cheliped (Fig. 3B-D) often equaling, sometimes exceeding, right in length but less robust; chela often narrowly to roundly triangular in dorsal view. Dactyl 0.85-1.2 length of palm; cutting edge with row of very small corneous teeth, terminating in corneous claw; dorsal surface flattened or weakly convex, with one to three longitudinal rows of small to moderately large spines in proximal 0.35-0.75, partially to entirely

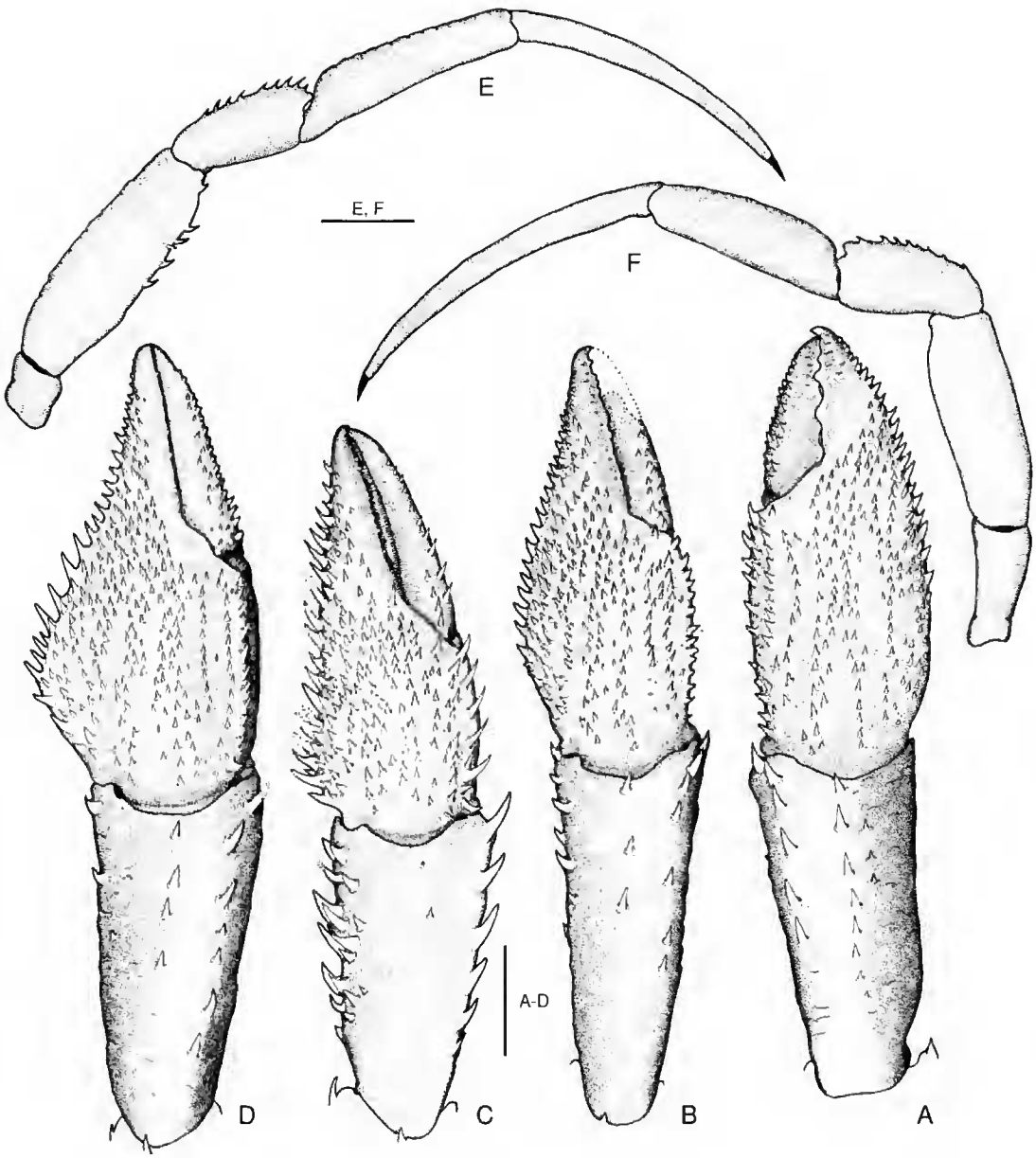

FIG. 3. — *Jacquesia polymorpha*, n.sp., A, B, E, F, holotype 5.0 mm (MNHN Pg 5655); C, ♂ paratype, 4.9 mm (MNHN Pg 5656); D, ♂, 3.7 mm (MNHN Pg 5668); **A**, carpus and chela of right cheliped (dorsal view, setae omitted); **B-D**, same of left cheliped; **E**, right second pereopod; **F**, left third pereopod (lateral view, setae omitted). Scale bars: 2 mm.

obscured by long setae; dorsomesial margin with row of short to moderately long spines decreasing in size distally and extending nearly to tip of fixed finger; mesial and ventral surfaces with tufts of long setae. Palm 0.65-0.80 length of carpus; dorsomesial and dorsolateral margins each with row of slender, short to quite long spines, dorsal surface flattened or with slightly elevated

rounded median plateau, surface with numerous irregular longitudinal rows of small spines and spinules extending at least onto proximal half of fixed finger, all partially to completely obscured by short and/or long setae; cutting edge of fixed finger with row of small calcareous teeth interspersed with small corneous teeth, terminating in small corneous claw; mesial, lateral and ventral surfaces also with numerous long setae. Carpus subtriangular, approximately as long to 0.35 longer than merus; dorsomesial margin with row of moderate to long acute spines at least in distal 0.65, usually second short row of smaller spines on sloping dorsolateral face, occasionally on one or two very small spinules; all partially obscured by long setae; mesial, lateral and ventral faces each with short transverse rows of long setae; somewhat rounded ventrolateral margin with irregular single or double row of spines, distalmost often extremely prominent, lateral face frequently with several smaller spines in ventral half. Merus with long setae on dorsal, lateral and ventral surfaces; dorsodistal margin with one spine; ventrolateral margin with two to five acute spines in distal half, ventromesial margin with one to three subacute spines near distal angle; ventral surface often with one to several small spines distally. Ischium with long setae on ventral margin.

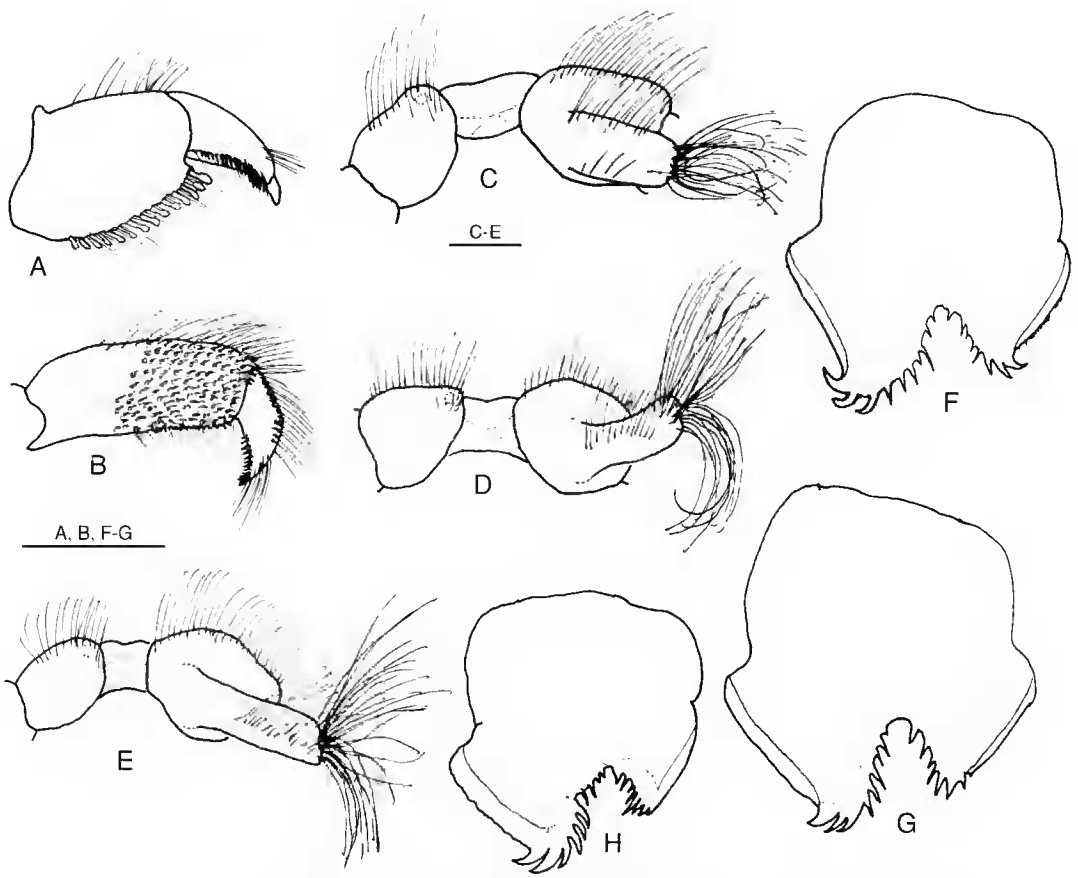

FIG. 4 — *Jacquesia polymorpha* n.sp., A, B, holotype, 5.0 mm (MNHN Pg 5655); C, F, ♂ paratype, 4.9 mm (MNHN Pg 5656); D, G, ♂, 4.7 mm; E, H, ♂, 3.7 mm (MNHN Pg 5675); **A**, dactyl and propodus of right fourth pereopod (lateral view); **B**, dactyl and propodus of right fifth pereopod (lateral view); **C-E**, sternite and coxae of last (eighth) thoracic sternite, showing left sexual tube and right gonopore (ventral view); **F-H**, telson. Scale bars: 1.0 mm.

Ambulatory legs (Figs 2B, 3E, F) similarly armed from left to right, but proportionally dissimilar. Dactyls of second right 1.0-1.4, third left 1.4-2.2 length of propodi; in dorsal view, straight; in lateral view, often somewhat curved ventrally; terminating in slender corneous claws; dorsal margins each with row of long bristle-like setae, mesial faces with covering of long stiff setae and dorsally accompanied by row of pinnate, spiniform setae in proximal half, mesial faces ventrally and/or ventromesial margins each with seven to ten shorter spiniform setae. Propodi of right second 1.4-2.2, propodi of third left 1.0-1.6 length of carpi; with long setae dorsally, arising from low protuberances, few scattered setae ventrally, ventrodistal margin with one or two spiniform setae mesially. Carpi each with row of five to twelve spines dorsal surface, but without spine at dorsodistal angle, spines of third pereopods usually smaller and sometimes fewer in number. Meri of second right pereopods longer and more slender than meri of third left; all with low protuberances and tufts of moderately long setae on dorsal margins; ventral margins of second pereopods each with two to five small spines or spinules in distal half; third unarmed. Ischia unarmed.

Sternite of third pereopods with small, subovate, roundly triangular, or subquadrate anterior lobe (Fig. 3C), un-armed or with one or two terminal spinules partially obscured by long setae. Fourth pereopods subchelate or very weakly semichelate. Coxae of fifth pereopods in males asymmetrical; left (Figs 2C-E, 3D) with thick, short to moderately long setose sexual tube directed posteriorly toward exterior.

Telson (Figs 1E, 4F-H) with posterior lobes slightly to moderately asymmetrical, each outer angle with one to three prominent, curved or hooked spines; terminal margins oblique, each with row of smaller acute spines.

Colour (in preservative)

Shield with splotches of orange, largest near posterior margin laterally. Ocular peduncles uniformly orange. Second segments of antennal peduncles opaque with orange distally. Chelipeds whitish, with orange band at mid-length of both dactyls and fixed fingers; palms orange on mesial faces at dorsodistal angles and in longitudinal streak on dorsal midline; carpi each with patch of orange distomesially and distolaterally, and one large orange spot proximally on mesial and lateral face; meri each with patch of orange on mesial and lateral faces at distal margins and one large orange spot on lateral face proximally.

Ambulatory legs whitish, each with three orange bands on dactyls, one distally, one in proximal half and one at proximal margin; propodi each with orange band at mid-length and orange spot on lateral face proximally; carpi each with patch of orange on distal margin mesially and laterally, patch of orange dorsally at mid-length on mesial face and spot in proximal half of lateral face ventrally; meri each with orange patch dorsodistally, two widely-separated orange spots on lateral face and additional orange spot on mesial faces of second pereopods. Ischia of third pereopods each with diffuse patch of orange laterally.

Reproduction

Females were ovigerous at shield lengths of 2.7-6.6 mm, and all carried numerous small eggs. The reproductive season appears to be quite prolonged, with egg-bearing females collected from August to March. Eggs were all in relatively early stages of development at the time of capture, with non-eyed eggs measuring from 0.62 to 0.82 mm in diameter.

Remarks

As its name implies, *Jacquesia polymorpha* is morphologically highly variable. These variations are most striking in the length of the male sexual tube and the shape of the left chela (Fig. 3B-D). The ten males from Vanuatu and the Chesterfield Islands had short sexual tubes (Figs 1D, 4C) and despite a size range of 2.6 to 5.0 mm (shield length), the sexual tube remained short, not reaching much if any beyond the coxal margin. These short sexual tubes appeared to arise more anteriorly on the coxa than the longer tubes, and as previously indicated, were pressed closely against the coxal surface. Among the thirty-four males with long sexual tubes, all from New Caledonia proper and the Kermadec Islands, shield lengths ranged from 2.0 to

TABLE 1. — Chelae width/length ratio in samples of *Jacquesia polymorpha* n.sp. with *short* male sexual tube (given as percent maximum width to length). **a. m.**, appendage missing.

Locality	Cruise/Station	Depth (m)	s.l. (mm)	Right chela		Left chela	
				♂	♀	♂	♀
Chesterfield	Mus. 5, CP 312	315-320	1.8	–	46	–	42
Chesterfield	Mus. 5, CP 312	315-320	2.8	–	42	–	38
Chesterfield	Mus. 5, CP 312	315-320	3.1	a. m.	–	40	–
Chesterfield	Mus. 5, CP 312	315-320	3.3	46	–	38	–
Vanuatu	Mus. 8, DW 1070	184-190	3.4	–	a. m.	–	38
Chesterfield	Mus. 5, CP 311	311	3.4	43	–	38	–
Chesterfield	Mus. 5, CP 318	330	3.5	43	–	39	–
Chesterfield	Chalcal 1, DC 61	250	3.6	42	–	32	–
Chesterfield	Chalcal 1, CP 17	295	3.7	40	–	39	–
Chesterfield	Mus. 5, CP 312	315-320	3.7	44	–	–	46
Chesterfield	Mus. 5, CP 312	315-320	3.8	–	43	–	42
Vanuatu	Mus. 8, DW 964	360-40	3.9	–	46	–	40
Chesterfield	Chalcal 1, DC 61	250	3.9	–	45	–	42
Chesterfield	Mus. 8, DW 963	400-440	4.0	–	44	–	46
Vanuatu	Mus. 5, CP 311	320	4.7	–	48	–	46
Chesterfield	Chalcal 1, DC 68	296	4.9	50	–	43	–
Vanuatu	Mus. 8, CP 1084	207-280	5.0	42	–	39	–
Average				*43.7*	*48.7*	*38.5*	*42.2*

TABLE 2. — Same data as Table 1 in samples of *Jacquesia polymorpha* n.sp. with *long* male sexual tube.

Locality	Cruise/Station	Depth (m)	s.l. (mm)	Right chela		Left chela	
				♂	♀	♂	♀
Chesterfield	Mus. 5, DW 361	400	2.2	47	–	50	–
N. Caledonia	Chalcal 2, DW 69	260	2.2	a. m.	–	40	–
N. Caledonia	Smib 4, DW 44	300	2.2	48	–	54	–
N. Caledonia	Smib 5, DW 87	370	2.3	44	–	51	–
N. Caledonia	Volsmar, DW 40	295	2.6	–	47	–	45
N. Caledonia	Mus. 4, DW 184	260	2.6	45	–	50	–
N. Caledonia	Smib 4, DW 46	260	2.9	–	48	–	49
N. Caledonia	Smib 5, DW 88	350	3.3	a. m.	–	56	–
N. Caledonia	Smib 5, DW 88	350	3.4	69	–	49	–
N. Caledonia	Smib 5, DW 88	350	3.5	–	50	–	54
N. Caledonia	Smib 4, DW 46	260	3.5	52	–	48	–
Chesterfield	Mus. 5, DW 378	355	3.6	43	–	47	–
N. Caledonia	Smib 5, DW 88	350	3.7	–	53	–	42
N. Caledonia	Mus. 4, DW 184	260	3.7	50	–	47	–
N. Caledonia	Mus. 4, DW 184	260	3.7	44	–	41	–
N. Caledonia	Smib 5, DW 88	350	4.2	46	–	49	–
N. Caledonia	Mus. 4, DW 184	260	4.5	64	–	–	–
N. Caledonia	Beryx 11, DW 18	250-270	4.5	55	–	50	–
N. Caledonia	Smib 4, DW 44	300	4.6	47	–	39	–
N. Caledonia	Smib 8, DW 165	372-660	4.7	42	–	41	–
N. Caledonia	Mus. 4, DW 184	260	4.8	a. m.	–	53	–
N. Caledonia	Volsmar, DW 40	295	4.9	50	–	46	–
Average				*48.7*	*49.5*	*48.7*	*47.5*

4.9 mm, and in all individuals the tube extended well beyond the distal coxal margin (Fig. 4D, E).
The dorsal surfaces of the chelae are covered by long setae accompanied by dense short setae, both of which almost entirely obscured the surface armature. The left chela is relatively broad, roundly triangular in males of the first group. In the second group the setal covering of the chelae consisted principally of dense long setae; and the left chela was relatively narrow and triangular.
In both groups of males, the right gonopore is quite small, developed near the anteromesial margin of the coxa, and it is at least partially concealed by the surrounding setae.
As with chela shape, there was some variation in the occurrence of short setae. All specimens had an abundant covering of long setae, both marginally and on the surfaces; however, most frequently, but not exclusively, the broader the chela, the more common the presence of short setae as well.
Armature of the chelipeds and ambulatory legs similarly showed considerable variation, that did not appear correlated either with sex or size. While spines on the margins of both palms were often relatively short (Fig. 3A, B, D), they also could be extremely elongate, slender and curved (Fig. 3C). Armature of the carpi of the left chelipeds was even more variable. A row of spines of moderate to appreciable size was always present on the dorsomesial margin, but while usually extending well onto the proximal half, the spine row sometimes would not reach beyond midlength. Spines on the sloping dorsolateral margin in some specimens formed a well defined row, but in others were replaced by only one or two spinules. Similarly, the lateral faces of these carpi were unarmed in some specimens, had only a ventral marginal row of spines or could be strongly spinose over the entire ventral half of the surface. Spines on the carpi varied both in number and in strength on both the second and third percopods.
The four specimens from the Philippines differed from all of the others in lacking the distinct row of long setae on the distal margin of the ultimate segment of the antennular peduncle. It did not appear that the setae had been lost during capture or as a result of preservation, as no row of setal pores could be detected under high magnification with light microscopy. There also appeared to be a slight difference in the density of the terminal setation of the male sexual tube; its length was generally intermediate between the long or short tubes observed in the other males. It is possible that these differences are indicative of a distinct Philippine subspecies; however, in view of the wide ranges of variation observed in other characters of *J. polymorpha* n.sp., we do not feel it prudent to propose a separate taxon for the Philippines specimens on the basis of four individuals.

DISCUSSION

We initially were of the opinion that two very similar species were represented in the collection. The first could be characterized in having short sexual tube that was not produced much beyond the distal margin of the coxa and was very closely applied against the coxa, giving the impression of partial fusion. Additionally, the setal covering of the chelae in this group consisted principally of dense long setae; the left chela was not narrow and triangular. The males of the second group each had a relatively long male sexual tube that extended well beyond the distal margin of the coxa, chelae with the dorsal surfaces covered by long setae accompanied by dense short setae, both of which almost entirely obscured the surface armature, and a relatively broad, roundly triangular left chela.
To test our hypothesis, we examined not only the length/width ratios of the left chela in the two groups, but also those of the right, and four other structures that are commonly conservative in pagurid species, looking for both inter-group differences and possible sexual dimorphism. Our sample sizes are too small for meaningful statistical analyses, but have provided the means for a substantive assessment.
As may be seen from Table 1 (first group), there was not an appreciable difference between the average ratios of either chela in males and females. In contrast, there was a suggestion of sexual dimorphism in the second group

TABLE 3. — Shield length/width; ocular peduncle/shield length ratios; percent overreach of antennular and antennal peduncles* in samples of *Jacquesia polymorpha*, new species, with *short* male sexual tube. *, percent ultimate antennular and/or antennal peduncular overreaches ocular peduncle (measured at distal corneal margin).

Cruise/Station	sl (mm)	Shield		Ocular peduncles		A1 peduncles		A2 peduncles	
		♂	♀	♂	♀	♂	♀	♂	♀
Mus. 5 CP312	1.8	–	93	–	89	–	60	–	24
Mus. 5 CP312	2.8	–	88	–	88	–	89	–	32
Mus. 5 CP312	3.1	93	–	74	–	90	–	26	–
Mus. 5 CP312	3.3	98	–	73	–	81	–	19	–
Mus. 8 DW1070	3.4	–	100	–	66	–	76	–	29
Mus. 5 CP311	3.4	82	–	90	–	78	–	17	–
Mus. 5 CP318	3.5	90	–	72	–	70	–	19	–
Chal. 1 DW 61	3.6	88	–	73	–	86	–	39	–
Chal.1 CP17	3.7	94	–	78	–	88	–	25	–
Mus. 5 CP312	3.7	–	98	–	74	–	73	–	27
Mus. 5 CP312	3.8	–	98	–	82	71	–	–	22
Mus. 8 DW964	3.9	–	100	–	92	–	88	–	33
Chalcal 1 DW61	3.9	–	96	–	71	–	80	–	32
Mus.8 DW963	4.0	–	102	–	70	–	116	–	33
Mus. 5 CP311	4.7	–	88	–	70	–	60	–	33
Chalc. 1 DW68	4.9	90	–	78	–	96	–	38	–
Mus. 8 CP1084	5.0	97	–	75	–	100	–	47	–
Average		*91.5*	*95.8*	*76.6*	*78.0*	*86.1*	*79.2*	*26.8*	*29.4*

TABLE 4. — Same data as Table 3 in samples of *Jacquesia polymorpha*, new species, with *long* male sexual tube.

Cruise/Station	sl (mm)	Shield		Ocular peduncles		A1 peduncles		A2 peduncles	
		♂	♀	♂	♀	♂	♀	♂	♀
Mus.5 DW361	2.2	92	–	92	–	53	–	15	–
Chal.2 DW69	2.2	97	–	94	–	56	–	19	–
Smib 4 DW44	2.2	97	–	82	–	79	–	26	–
Smib 4 DW87	2.3	97	–	92	–	56	–	30	–
Volsm. DW40	2.6	–	100	–	80	–	82	–	29
Mus. 4 DW184	2.6	83	–	91	–	94	–	38	–
Smib 4 DW46	2.9	–	85	–	85	–	80	26	–
Smib 5 DW88	3.3	96	–	71	–	86	–	50	–
Smib 5 DW88	3.4	93	–	88	–	–	80	–	26
Smib 5 DW88	3.5	–	96	–	84	–	87	–	28
Smib 4 DW46	3.5	80	–	80	–	89	–	27	–
Mus. 5 DW378	3.6	89	–	88	–	80	–	40	
Smib 5 DW88	3.7	–	100	–	72	–	94	–	42
Mus. 4 DW184	3.7	96	–	84	–	87	–	28	–
Mus. 4 DW184	3.7	–	93	–	68	–	62	–	42
Smib 5 DW88	4.2	101	–	84	–	81	–	24	–
Mus. 4 DW184	4.3	87	–	91	–	90	–	32	–
Ber. 11 DW18	4.5	94	–	89	–	50	–	17	–
Mus. 4 DW184	4.5	–	93	–	64	–	91	–	44
Smib 4 DW44	4.6	97	–	87	–	85	–	24	–
Smib 8 DW165	4.7	97	–	82	–	67		40	–
Mus. 4 DW184	4.8	–	90	–	88	–	95	–	52
Volsmar DW40	4.9	101	–	82	–	75	–	20	–
Average		*95.5*	*93.8*	*85.9*	*77.3*	*75.5*	*82.1*	*28.5*	*43.1*

(Table 2); males of this group tended to have noticeably narrower chelae. Although an average difference can be seen between the two groups, their ranges do overlap. In the four additional characters (Tables 3, 4), the average ratios of shield length to width were not appreciably different between the sexes in the first group, but longer shields were more common in females of the second group. When the ratios of shield length to ocular peduncular length were examined, the reverse was true. Differences in the average ratios between males and females of the first group were pronounced, but only slight in the second group. In the distance that both the antennular peduncles and antennal peduncles extended beyond the distal margins of the corneas (given as the ratio of extension to ocular peduncle length, in percent), females of the first group averaged appreciably greater extension than did males, whereas males averaged greater antennular peduncle extension in the second group and antennal peduncular extension was very similar between the sexes. Although averages of all ratios differed between the two groups, ranges overlapped. No definitive patterns could be detected that would support the hypothesis of two taxa represented.

We then looked at the bathymetric and geographic distributions of the two groups. As may be seen in Tables 1, 2 with only two exceptions, all specimens of the group characterized by a broad chela and long male sexual tube came from the New Caledonia area; specimens of the second group all were collected in the Chesterfield Islands and Vanuatu. The three specimens from the Kermadec Islands, while not included in our morphometric examination, are assignable to the first group. No differences in bathymetric distributions have been observed. Therefore, we have concluded that the morphological variation seen in *Jacquesia polymorpha*, new species, is more probably a function of geography and/or habitat than genetic difference. However, because our determination has been made on a relatively small sample, the possibility that two taxa really are involved cannot be totally ignored. For that reason, we have selected the holotype and paratypes exclusively from the group characterized by the short male sexual tube and narrow left chela.

Acknowledgements

We express our sincere thanks to Jacques Forest, Muséum national d'Histoire naturelle, Paris, Alain Crosnier, Office national de la Recherche Scientifique et Technique Outre Mer, Paris, and Steve O'Shea, National Institute of Water and Atmospheric Research, Wellington, for providing much of the material upon which this study has been based. This is a scientific contribution from the Shannon Point Marine Center, Western Washington University.

REFERENCES

Forest J. 1985. — I et II - Philippines (1976, 1980), résultats des campagnes Musorstom. Tome 2. *Mémoires du Muséum national d'Histoire naturelle* (A) Zoologie 133 : 7-30, figs 1, 2.

McLaughlin P. A. 1997. — Crustacea Decapoda: Hermit crabs of the family Paguridae from the KARUBAR cruise in Indonesia, *in* Crosnier A. & Boucher P. (eds), Résultats des Campagnes Musorstom. Volume 16. *Mémoires du Muséum national d'Histoire naturelle* 172 : 433-572, figs 1-44.

McLaughlin P. A. & Saint Laurent M. de 1998. — A new genus for four species of hermit crabs heretofore assigned to the genus *Pagurus* Fabricius (Decapoda: Anomura: Paguridae). *Proceedings of the Biological Society of Washington* 111 (1): 158-187, figs 1-12.

Milne Edwards A. 1880. — Report on the results of dredgings, under the supervision of Alexander Agassiz, in the Gulf of Mexico, and in the Caribbean Sea, 1877, 78, 79, by the United States Coast Survey steamer "Blake", Lieut.-Commander C.D. Sigsbee, U.S.N., and Commander J. R. Bartlett, U.S.N., commanding. VIII. Études préliminaires sur les Crustacés. *Bulletin of the Museum of Comparative Zoology, Harvard College* 8 (1): 1-68.

Richer de Forges B. 1990. — Les campagnes d'exploration de la faune bathyale dans la zone économique de la Nouvelle-Calédonie. Explorations for bathyal fauna in the New Caledonia economic zone, *in* A. Crosnier (ed.), Résultats des Campagnes Musorstom. Volume 6. *Mémoires du Muséum national d'Histoire naturelle* (A) 145 : 9-54, figs 1-13.

— 1993. — Les campagnes d'exploration de la faune bathyale faites depuis mai 1989 dans la zone économique de la Nouvelle-Calédonie. Liste de stations, *in* Crosnier A. (ed.), Résultats des Campagnes Musorstom. Volume 10. *Mémoires du Muséum national d'Histoire naturelle* 156 : 27-34.

Richer de Forges B. & Chevillion C. 1996. — Les campagnes d'échantillonnage du benthos bathyal en Nouvelle-Calédonie en 1993 et 1994 (Bathus 1 & 4, SMIB 8 et Halipro 1), *in* Crosnier A. (ed.), Résultats des Campagnes Musorstom. Volume 15. *Mémoires du Muséum national d'Histoire naturelle* 168 : 35-53, figs 1-5.

Richer de Forges B., Faliex E. & Menou J.-L. 1996. — La campagne Musorstom 8 dans l'archipel de Vanuatu. Compte rendu et liste des stations, *in* Crosnier A. (ed.), Résultats des Campagnes Musorstom. Volume 15. *Mémoires du Muséum national d'Histoire naturelle* 168 : 9-32, figs 1-16.

Saint Laurent-Dechancé M. de 1966a. — *Iridopagurus*, genre nouveau de Paguridae (Crustacés Décapodes) des mers tropicales américaines. *Bulletin du Muséum national d'Histoire naturelle*, Paris, série 2, 38 (2) : 151-173, figs 1-38.

— 1966b. — Remarques sur la classification de la famille des Paguridae et sur la position systématique d'*Iridopagurus* de Saint Laurent. Diagnose d'*Anapagrides* gen. nov. *Bulletin du Muséum national d'Histoire naturelle*, Paris, série 2, 38 (3) : 257-265.

Submitted on 21 May 1998;
accepted on 6 October 1998.